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110,622

Application Date : 28th Nov., 1939. No. 5283/39.

Under International or Intercolonial Arrangements.
(France, 29th July, 1939.)

Applicant (Assignee of Actual Inventor) .. PATEX SOCIETE ANONYME.
Actual Inventor .. .. .. HUGO WURZBURGER.
Application and Complete Specification .. Accepted, 14th May, 1940.
Acceptance Advertised (Sec. 50) .. 30th May, 1940.

Class 74.5.

Drawing attached.

COMPLETE SPECIFICATION.

"Improvements in and relating to pipe couplings."

We, PATEX SOCIETE ANONYME, a Body Corporate organized under the Laws of Switzerland, of 16 Aeschenvorstadt, Basle, Switzerland, Manufacturers, hereby declare this invention and the manner in which it is to be performed to be fully described and ascertained in and by the following statement:—

This invention relates to pipe couplings of the kind comprising a coupling member having a conical mouth in which the pipe to be connected is received, a second coupling member adapted to be coupled to the first and a packing ring which surrounds the pipe and, when the coupling members are coupled together, is moved axially along the pipe into the conical mouth of the one coupling member and thereby deformed.

The object of the invention is to provide an improved coupling of the aforesaid kind which remains tight no matter what fluid is conveyed in the pipe or its pressure and temperature, or what material the pipe may be made of.

According to the invention, the ring has a sharp cutting edge which is harder than the metal of the pipe and has a cutting angle exceeding 0° and not exceeding 45° to the perpendicular to the pipe and digs into the surface of the pipe and throws up an annular ridge of metal when the coupling members are coupled together.

The cutting angle of the edge of the ring varies in accordance with the material of which the pipe to be connected is made. For example, the cutting angle may be between 2° and 15° when the pipe is made of brass or steel and the ring of steel or surface hardened steel, while when the pipe is made of copper, aluminium or light alloy and the ring of brass or steel the cutting angle exceeds 0° and preferably does not exceed 10°.

In accordance with a further feature of the invention, the ring is formed at the end with an annular recess, and the cutting edge, which is bevelled off at a predetermined angle, is formed at the inner edge of the

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annular recess; by this means the ring is prevented from damaging the conical mouth of the one coupling member when the coupling members are coupled together. The ring may also be provided with two or more cutting edges each of which is bevelled off at an appropriate cutting angle. The ring may either be made of a material which is harder than that of the tube or pipe to be coupled; or the ring or its cutting edge may be surface hardened by any known process, such as cyanuration for example.

The material of which the ring is made is preferably resilient to a certain extent, so that the ring, of which one end bears on the ridge of metal which is thrown-up and the other end against the end face of one of the coupling members, acts as a braking member to prevent the coupling being loosened by vibration.

In order that the invention may be readily understood and carried into effect a pipe coupling and various forms of rings constructed in accordance with the invention are illustrated by way of example in the accompanying drawing, in which—

Figure 1 is a view partly in section showing a coupling in coupled condition.

Figure 2 is a view of the ring partly in section.

Figure 3 is a similar view showing a ring having a cutting edge bevelled off at an angle.

Figure 4 is a similar view showing another form of ring.

Figure 5 is a view partly in section of a coupling having a ring of the kind shown in Figure 4.

Figure 6 is a view on a larger scale and partly in section of a ring provided with two cutting edges, each of which is bevelled off at an angle, and

Figure 7 is a view similar to Figure 6 showing a ring having a hardened surface.

Referring to the drawing, the coupling comprises a coupling member 1 provided with a conical mouth 2 upon which is screwed a second coupling member or nut 3.

The coupling also comprises a ring 4 having an internal diameter which is slightly greater than the external diameter of the pipe 5 to be connected. The ring 4 is provided with a sharp edge 6 (see Figure 2). When the nut 3 is tightened up, the ring 4 enters into the conical mouth 2 of the coupling member 1 and is thereby deformed in such a manner that the sharp edge 6 digs into the external surface of the pipe 5 and throws up an annular ridge of metal 7.

In this way the sharp edge 6 cuts into the longitudinal ridges which are present on the external surface of any drawn metal tube and are the cause of leakage. It will be understood therefore that a perfectly tight joint is obtained. The sharp edge of the ring, after having cut into the longitudinal ridges, on the one hand seats itself in the external surface of the pipe, and on the other hand the external surface of this ring adjusts itself to form a perfect fit against the internal surface of the conical mouth 2 of the coupling member 1. The ridge also holds the tube or pipe in position and prevents it from being loosened or removed either by external pulling or by the effect of internal pressure.

In the ring shown in Figure 2 the sharp edge 6 has a cutting angle which is at an angle of 0.1° to the axis of the pipe. In order to enable the edge 6 of the ring to penetrate into the external surface of the pipe, the end of the ring is preferably bevelled off at an angle which varies in accordance with the nature of the pipe to be connected. Figure 3 shows a ring having a cutting edge 8 running at an angle to the perpendicular to the axis of the pipe. This angle α varies from 0.1—45° according to the nature of the pipe to be connected, that is to say in accordance with whether the pipe to be connected is made of steel, copper, brass, aluminium, a light alloy or other material.

The most appropriate cutting angle for pipes of copper, aluminium or light alloy is an angle exceeding 0° and not exceeding 10°.

For pipes of steel or brass, on the other hand, an angle α between 2° and 15° is preferable. In either case the cutting edge of the ring is harder than the material of the pipe.

A ring suitable for connecting pipes of any material is therefore obtained by giving the ring of a cutting angle of 2° to 10°; such a ring is able to embed itself into the external surface of pipes made of copper, aluminium, light alloy or of steel or brass.

Figure 4 shows another form of ring provided with a sharp edge having a cutting angle α. In this form of ring the edge 9 is situated internally in a recess, so that the ring has a projecting tongue 10 at its end. A ring of this kind has the advantage that it can be deformed as it enters the conical mouth 2 of the coupling member 1 without injuring the conical mouth. When the nut is tightened, the ring 4 is deformed in the conical mouth 2 of the coupling member 1 but, owing to the slight thickness of the tongue 10, the latter is bent inwardly and cannot therefore cut into the surface of the conical mouth 2 and damage it.

Figure 5 shows a coupling provided with the ring shown in Figure 4. The connection is effected in the same manner as described with reference to Figure 1.

Figure 6 shows a ring which, instead of being provided with one sharp edge having a cutting angle α is provided with two sharp edges. For this purpose, the end of the tongue 10 is machined in such a manner that it presents a sharp edge 11 having a cutting angle α and another sharp edge 12 having the same cutting angle α is formed in a recess below the tongue. The ring 6 is made in such a manner that, when the coupling is tightened, the edges 11 and 12 cut simultaneously into the pipe and throw up an annular ridge of metal. This ring has the advantage that it can be used for coupling thin-walled pipes without deforming them, owing to the fact that the radial component of the forces which come into play when the coupling members are coupled together is distributed over two edges instead of one. The two edges have the same cutting angle α as described above; the size of the angle depends upon the nature of the pipe to be connected.

The ring provided with the edge, or edges, having a particular cutting angle is made in all cases of a material which is harder than that of the pipe. For coupling steel pipes the ring may be subjected to a thermal treatment which gives it a greater surface hardness than that of the pipe to be connected. For this purpose a ring made of steel having a low carbon content can be subjected to a known surface-hardening treatment. A ring of this kind presents the advantage of having a surface hardness greater than that of the pipe to be connected while having a soft core which allows of its deformation in the conical mouth of the coupling member 1 without breaking.

Figure 7 shows such a ring having a sharp edge 13 with a cutting angle α and a tongue 10 which is deflected in the conical mouth 2 when the coupling members are coupled together, so that it cannot damage the bore and, owing to the fact that it has been subjected to thermal treatment, has a hardened surface layer 14 which is harder than the pipe and a core 15 which has remained soft.

The ring also acts as a braking member and prevents the nut from becoming loose owing to vibration. This is due to the fact that the ring is elastically deformed in the conical mouth 2 of the coupling member 1 and bears against the ridge 7 and the conical mouth 2 and thus presses against the base 16 of the nut 3 and acts like a "Grower" washer.

Finally, according to another feature of the invention, the ring 4 is coated with cadmium which favours the deformation of the ring in the conical bore 2 and the making of a tight joint. In this case the cadmium acts simultaneously as a lubricant and as a seal.

Having now fully described and ascertained our said invention, and the manner in which it is to be performed, we declare that what we claim is:—

1. A pipe coupling of the kind comprising a coupling member having a conical mouth in which the pipe to be connected is received, a second coupling member adapted to be coupled to the first and a packing ring which surrounds the pipe and, when the coupling members are coupled together, is moved axially along the pipe into the conical mouth of the one coupling member and thereby deformed, wherein the ring has a sharp cutting edge which is harder than the metal of the pipe and has a cutting angle exceeding 0° and not exceeding 45° to the perpendicular to the pipe and digs into the surface of the pipe and throws up an annular ridge of metal when the coupling members are coupled together.

2. A pipe coupling in accordance with Claim 1, wherein the cutting edge of the

ring is bevelled off at an angle which varies in accordance with the material of which the pipe is made.

3. A pipe coupling in accordance with Claim 2, wherein when the coupling is used for coupling pipes made of copper, aluminium or a light alloy, the cutting edge of the ring is bevelled off at an angle exceeding 0° and not exceeding 10°.

4. A pipe coupling in accordance with Claim 2, wherein, when the coupling is used for coupling pipes made of steel or brass, the cutting edge of the ring is bevelled off at an angle between 2° and 15°.

5. A pipe coupling in accordance with any preceding claim, wherein the ring is provided with a cutting edge and a tongue of slight thickness for preventing the edge of the ring from cutting into the surface of the conical mouth of the one coupling member.

6. A pipe coupling in accordance with any of the Claims 1—4, wherein the ring has two or more cutting edges which are bevelled off at the same angle.

7. A pipe coupling in accordance with any preceding claim, wherein the ring is made of steel of low carbon content and superficially hardened.

8. A pipe coupling in accordance with any preceding claim, wherein the ring is provided with a coating of cadmium.

9. A pipe coupling substantially as described with reference to Figures 1 and 2, or to Figure 3, or to Figures 4 and 5 or to Figure 6, or to Figure 7 of the accompanying drawing.

Dated this 27th day of November, A.D. 1939.

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Witness—L. Spinks.

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7. A pipe coupling in accordance with any preceding claim, wherein the ring is made of steel of low carbon content and superficially hardened.

8. A pipe coupling in accordance with any preceding claim, wherein the ring is provided with a coating of cadmium.

9. A pipe coupling substantially as described with reference to Figures 1 and 2 or to Figure 3, or to Figures 4 and 5 or to Figure 6, or to Figure 7 of the accompanying drawing.

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Fig. 1.

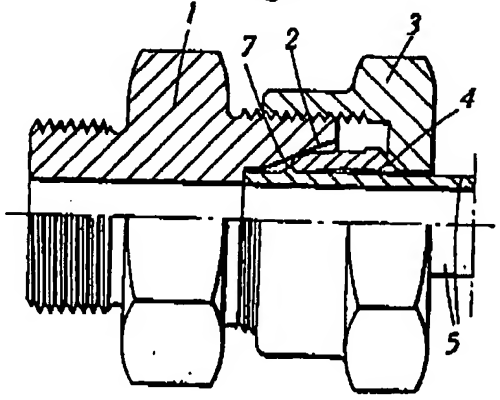

Fig. 2.

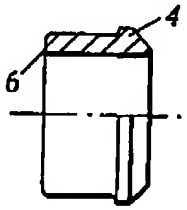

Fig. 5.

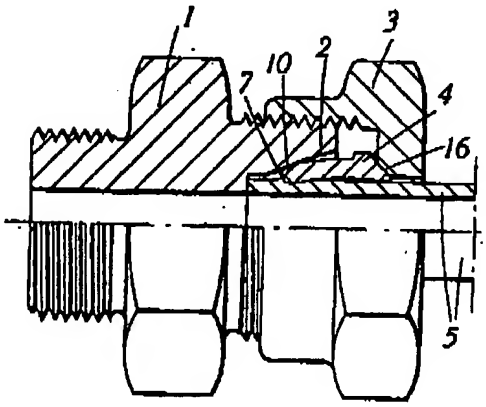

Fig. 3.

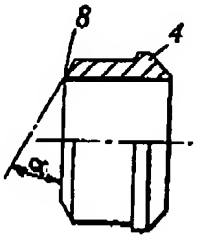

Fig. 4.

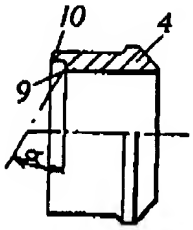

Fig. 6.

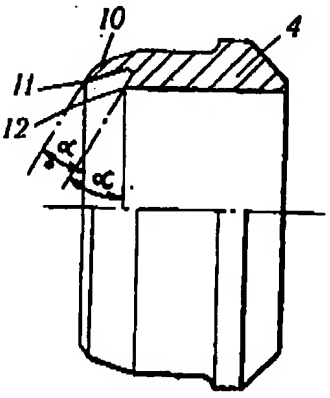

Fig. 7